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second convection chamber in at least one unit of said assembly of multiple units, and the at least one duct connects the first convection chamber with the second convection chamber.

22. (Amended) An assembly of multiple units for the hydrocarbon reforming process, each unit comprising the apparatus as in claim 1.

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23. (Amended) An assembly as in claim 22 further comprising at least one duct, wherein the at least one convection chamber comprises a first convection chamber and a second convection chamber in at least one unit of said assembly of multiple units, and the at least one duct connects the first convection chamber with the second convection chamber.

Remarks

No new matter is added by the foregoing amendments.

Claims 1-24 are pending. Claims 25-32 were previously withdrawn from further consideration by the Examiner as being drawn to an non-elected invention on the grounds that there is no allowable generic or linking claim. Reconsideration and allowance of all claims, as amended, are requested for the reasons discussed below.

The Title

The Examiner objected to the title on the grounds that the original title referred to both an apparatus (elected claims) and a method (non-elected claims) for hydrocarbon reforming process. Applicants have amended the title by removing the words "and method" so that the title now refers only to an apparatus.

Objections

The Examiner objected to claims 1 and 21-24 because claim 1 at lines 4-5 stated: "a first and a second end" rather than "a first end and a second end." Applicants have amended claim 1 by inserting - - end - - after "first." Accordingly, the Examiner's objection should be withdrawn.

The § 112 Rejections

The Examiner rejected claims 1-24 under § 112, second paragraph, on the grounds that there is insufficient antecedent basis for the limitation "said first end" at line 5 of claim 1, as more than one "first end" is recited prior to said limitation. Applicants have amended claim 1 by adding - - of said at least one convection chamber - - after "said first end," so that the limitation in question now reads: "said first end of said at least one convection chamber." The Examiner rejected claims 1, 2, 4, 5, 11-13 and 16 under § 112, second paragraph, on the grounds that there is insufficient antecedent basis for the limitations "said combustion chamber" and "said convection chamber" throughout the claims. Applicants have amended claims 1, 2, 4, 5, 11-13 and 16 by inserting the phrase - - at least one - - in both of said limitations throughout the claims, so that those limitations now read: "said at least one combustion chamber" and "said at least one convection chamber."

The Examiner rejected claims 8, 18 and 22 under § 112, second paragraph, on the grounds that it is not clear what is the difference between "a hydrocarbon reforming process" in claims 8, 18 and 22 and "a hydrocarbon reiforming process" in claims 1, 2 and 16. Applicants have amended claims 8, 18 and 22 by changing "a" to - - the - - before the phrase "hydrocarbon reforming process" in claims 8, 18 and 22.

The Examiner also rejected claims 8, 18 and 22 under § 112, second paragraph, with regard to the limitation "an apparatus" on the grounds that it is not clear what is the difference between "an apparatus" in those claims and "an apparatus" in claims 1, 2 and 16. Applicants have amended claims 8, 18 and 22 by replacing "an" with - - the - - before the word "apparatus" in claims 8, 18 and 22.

The Examiner rejected claims 19 and 23 under § 112, second paragraph, on the grounds that those claims did not clearly state that the first and second convection chambers are related to the at least one convection chamber in claims 1 and 16, respectively. Claims 19 and 23 have been amended to more clearly state the relationship of the first and second convection chambers to the at least one convection chamber.

In view of the aforesaid amendments in the claims, the rejections under § 112, second paragraph, should be withdrawn.

The § 102 Rejections

The Examiner rejected claims 1 and 21 under § 102(b) as being anticipated by Arisaki, *et al.* (U.S. Pat. No. 5,181,990). The Examiner took the position that Figures 1 and 5 of Arisaki, *et al.* disclose all of the elements of Applicants' invention as claimed in claims 1 and 21, and that the rejected claims structurally read on the apparatus of Arisaki, *et al.* For the reasons set forth below, Applicants respectfully disagree.

Arisaki, *et al.* does not disclose an apparatus for a hydrocarbon reforming process having all of the elements in claims 1 and 21. One element in particular that is not shown in Arisaki, *et al.*'s pyrolysis furnace for cracking hydrocarbons is a second reaction chamber, a substantial portion of the second reaction chamber disposed in the convection chamber. Contrary to the Examiner's contention, the convection coil 6 in Arisaki, *et al.*'s furnace is not a

"reaction chamber" like the second reaction chamber in Applicants' apparatus for a hydrocarbon reforming process. The convection coil 6 in Arisaki, *et al.* is a preheating coil in a preheating zone of the furnace taught by Arisaki, *et al.* Unlike the reaction chambers (*e.g.*, reformer tubes) in Applicants' reformer, no reaction takes place in the convection coil 6 of the pyrolysis furnace of Arisaki, *et al.* *not preheating, is a reaction chamber*

Since Applicants' invention includes at least one feature (a second reaction chamber in the convection chamber) that is not disclosed by Arisaki, *et al.*, withdrawal of the rejection of claims 1 and 21 under §102 is required.

The Examiner rejected claims 1-8, 11-18 and 21-22 under §102(b) as being anticipated by Ohsaki, *et al.* (U.S. Pat. No. 5,199,961). The Examiner took the position that this reference discloses all of the elements of Applicants' claimed invention as set forth in the rejected claims and that the rejected claims structurally read on the apparatus of Ohsaki, *et al.* For the reasons set forth below, Applicants respectfully disagree.

Ohsaki, *et al.* does not disclose an apparatus for a hydrocarbon reforming process having all of the elements in independent claims 1, 2, and 16, and in the dependent claims 3-8, 11-15, 17, 18, 21 and 22. In particular, Ohsaki, *et al.* does not disclose two separate and distinct chambers (*e.g.*, reformer tubes) - - one in the combustion chamber and the other in the convection chamber - - as in claims 1, 2, and 16. Rather, Ohsaki, *et al.* discloses only a single type of tube 10, part of which is in the radiant heat transfer space 110 and part of which is in the convection heat transfer space 120. *does not disclose separate spaces*

Since Applicants' invention, as claimed in independent claims 1, 2, and 16 and in dependent claims 3-8, 11-15, 17, 18, 21 and 22, includes at least one feature (*e.g.*, a first reaction chamber or reformer tube in the combustion chamber, and a second reaction chamber

or reformer tube in the convection chamber) that is not disclosed by Ohsaki *et al.*, withdrawal of the rejection of claims 1-8, 11-18 and 21-22 is required.

The Examiner rejected claims 1, 2, 4, 5, 8-11, 16, 18-20, and 22-24 under § 102(b) as being anticipated by Bruck (U.S. Pat. No. 4,440,727). The Examiner took the position that this reference discloses all of the elements of Applicants' claimed invention, and that claims 1, 2, 4, 5, 8-11, 16, 18-20, and 22-24 structurally read on the apparatus of Bruck. For the reasons set forth below, Applicants respectfully disagree.

The previous Examiner (Andrew G. Melick), in an Office Action mailed June 28, 2002, acknowledged that Applicants' claimed invention is different from Bruck in that "... Bruck does not disclose this second chamber as a reaction chamber." Applicants agree. Accordingly, Bruck does not anticipate claims 1, 2, 4, 5, 8-11 and 22-24, since all of those claims as originally written included "a second reaction chamber", a substantial portion of said second reaction chamber disposed in said convection chamber." (emphasis added). Similarly, since claims 16 and 18-20 as originally written included "a second reformer tube," a substantial portion of which is disposed in the convection chamber, and that element is not disclosed in Bruck, those claims also are not anticipated by Bruck.

Contrary to the Examiner's suggestion, the recuperators 4 and the heat exchangers 10 disclosed in Bruck do not correspond to the second reaction chamber in claims 1 and 2 (or the second reformer tube in claim 16) of Applicants' claimed invention. Bruck's heat exchangers 10 are positioned in the flue gas-branch channel to preheat combustion air, and no reaction takes place in those heat exchangers. See, column 2, lines 41-44. Similarly, there is no reaction in Bruck's recuperators 4, which are used for preheating the combustion air. See, column 1, lines 28-47, and lines 65-68.

Since Bruck does not disclose an apparatus for a hydrocarbon reforming process having all of the elements in claims 1, 2, 4, 5, 8-11, 16, 18-20 and 22-24, withdrawal of the rejection of those claims under § 102 is required.

In addition to the fact that the three references (Arisaki, *et al.*, Ohsaki, *et al.*, and Bruck) are distinguishable from Applicants' original claims for the reasons discussed above, those references also are further distinguishable from Applicants' amended claims. Applicants have voluntarily amended independent claims 1, 2, and 16 in the manner discussed below to more clearly and distinctly claim their invention, not to avoid the references cited by the Examiner.¹ However, by amending those claims for clarification, it became apparent that there are one or more additional differences between Applicants' claimed invention and the cited references.

Applicants' claimed invention in amended independent claims 1, 2, and 16 is different from the cited references in that it has two independent feeds to two separate reaction chambers. Specifically, the following elements in amended independent claims 1, 2, and 16 are not disclosed in the cited references:

a first reaction chamber adapted to receive a first portion of a mixed-feed,
a substantial portion of said first reaction chamber disposed in said at least one
combustion chamber; and

¹ Support for the amendments appears in Figures 2, 6-8, and 19 of the drawings, and in the specification at page 12, lines 3-13 and lines 17-21; page 12, line 25 to page 13, line 2; and page 13, lines 5-9.

a second reaction chamber adapted to receive a second portion of said mixed-feed or another mixed-feed, a substantial portion of said second reaction chamber disposed in said at least one convection chamber.²

In the embodiment of Applicants' reformer shown in Figure 2 of their application, a first reaction chamber 22 which receives a first portion of the mixed-feed through inlet 38 is located in the combustion chamber 16, and a second reaction chamber 26 which receives a second portion of the mixed-feed (or another mixed-feed) through inlet 34 is located in the convection chamber 18. (See also the arrangements shown in Figures 6-8). None of the cited references teach or disclose such an arrangement of separate first and second reaction chambers located in the combustion and convection chambers respectively, each of the reaction chambers receiving an independent feed. Therefore, Applicants' claimed invention is significantly different than the cited references both structurally and in arrangement.³

² The quoted language appears in amended claims 1 and 2. The same language appears in amended claim 16, except that "reformer tube" is used instead of "reaction chamber."

³ Anticipation requires the disclosure in a single prior art reference of each element of the claim under consideration. It is not enough, however, that the reference disclose all the claimed elements in isolation. Rather, the prior art reference must disclose each element of the claimed invention "arranged as in the claim." *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 431, 485 (Fed. Cir. 1984) (citing *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 220 USPQ 193 (Fed. Cir. 1983)) (emphasis added). Thus, even if a prior art reference includes all the elements that are claimed, if the arrangement of the claimed elements is different from the arrangement of the prior art elements, anticipation will not be present. Further, anticipation will not be found when the prior art is lacking or missing a specific feature of the structure of the claimed invention. "Every element of the claimed invention must be literally present, arranged as in the claim." *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989) ("The identical invention must be shown in as complete detail as is contained in the... claim.") (emphasis added) See, the comment in MPEP § 2131.

Since Applicants' invention includes at least one feature (previously discussed) that is not disclosed by the cited references, withdrawal of the rejections under § 102 is required. Even assuming, *arguendo*, that those references disclose all of the elements of Applicants' invention, withdrawal of the § 102 rejections is required because the references do not disclose each element of Applicants' claimed invention arranged as in the amended claims.

For all of the foregoing reasons, withdrawal of the rejections under § 102 is requested.

The § 103 Rejections

The Examiner rejected claim 22 under § 103(a) as being unpatentable over Arisaki, *et al.* (U.S. Pat. No. 5,181,990). In support of her position, the Examiner said:

Regarding claim(s) 22, Arisaki, *et al.* disclose(s) all of the claim limitations as set forth above except for reciting an assembly of multiple units. It would have been obvious to one having ordinary skill in the art at the time the invention was made to add additional units, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

However, since independent claim 1 is non-obvious under § 103 (as the Examiner has not made a *prima facie* case of obviousness with regard to claim 1), claim 22 which depends from claim 1 also is non-obvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988). Therefore, the rejection of claim 22 under § 103 should be withdrawn.

The Examiner rejected claims 1-24 under § 103(a) as being unpatentable over Makabe, *et al.* (U.S. Pat. No. 5,226,928) in view of Ohsaki, *et al.* (U.S. Pat. No. 5,199,961).

However, the § 103 rejection of claims 1-24 is improper because there is no teaching, suggestion, or motivation to combine the cited references to produce Applicants' claimed invention. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the

combination. *In re Mills*, 916 F.2d 680, 682, 16 USPQ2d 1430, 1432 (Fed. Cir. 1990); *In re Fritch*, 972 F.2d 1260, 1265-66, 23 USPQ2d 1780, 1783-84 (Fed. Cir. 1992); *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1316 (Fed. Cir. 2000). Since the prior art does not suggest the desirability of combining the cited references, the Examiner has not made a *prima facie* case of obviousness.

Accordingly, for the above reason, the rejection of claims 1-24 under § 103 should be withdrawn.

The Examiner also rejected claims 1-24 under § 103(a) as being unpatentable over Bruck (U.S. Pat. No. 4,440,727) in view of Ohsaki, *et al.* (U.S. Pat. No. 5,199,961).

However, the § 103 rejection of claims 1-24 is improper because there is no teaching, suggestion, or motivation to combine the cited references to produce Applicants' claimed invention. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills, supra.*; *In re Fritch, supra.*; *In re Kotzab, supra.* Since the prior art does not suggest the desirability of combining the cited references, the Examiner has not made a *prima facie* case of obviousness.

Moreover, it is improper to combine the cited references in any of the possible combinations because those references do not address or solve the problems addressed by Applicants' claimed invention, nor do the references appreciate the advantages of Applicants' claimed invention. Therefore, the § 103 rejection of independent claims 1, 2, and 16 based on the combinations used by the Examiner is inappropriate. *See, In re Fine*, 837 F.2d 1071, 1075-76, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988); and *Diversitech Corp. v. Century Steps, Inc.*, 850 F.2d 675, 679, 7 USPQ2d 1315, 1318 (Fed. Cir. 1988) (problem confronted by the inventor must

be considered in determining whether it would have been obvious to combine references in order to solve that problem).

For example, Applicants' claimed invention addresses, *inter alia*, the problem of utilizing the high grade sensible heat of flue gas and product synthesis gas to generate additional product gas and minimize steam export. None of the cited references address that problem.

Bruck is directed to a tube furnace for the performance of gas reactions, especially for the production of hydrocyanic acid according to the BMA process. Although Makabe, *et al.* does involve a reforming apparatus, the object of Makabe, *et al.* is to provide a compact reforming apparatus that is suitable for a fuel cell application. The object of Arisaki, *et al.* is to provide a pyrolysis furnace or hydrocarbon cracking furnace that has the ability to supply heat through two stages of burners (4 and 8) to match the heat demanded of the hydrocarbon cracking process in the reaction tube 12, and especially, on the tube inlet side 14 in the combustion chamber. The object of Ohsaki, *et al.* is to provide a catalytic reaction apparatus that utilizes flue gas sensible heat in the upper part of the furnace and an equalizing plate in the lower part of the furnace. Since the cited references, individually or in combination, do not address the problems solved by Applicants' claimed invention or appreciate the advantages of Applicants' claimed invention, these references cannot be used to render obvious any of the pending claims.

Accordingly, for the above reasons, the rejection of claims 1-24 under § 103 should be withdrawn.

The Examiner rejected claims 3, 17 and 21 under § 103(a) as being unpatentable over Bruck in view of Arisaki, *et al.* However, since independent claim 2 is non-obvious under § 103 (as the Examiner has not made a *prima facie* case of obviousness), dependent claim 3 which depends from claim 2 also is non-obvious. *In re Fine, supra*. Similarly, since independent claim

16 is non-obvious under § 103 (as the Examiner has not made a *prima facie* case of obviousness), claims 17 and 21 which depend from claim 16 also are non-obvious. *Id.*

Accordingly, for the above reasons, the rejection of claims 3, 17 and 21 under § 103 as being unpatentable over Bruck in view of Arisaki, *et al.* should be withdrawn.

The Examiner rejected claims 6-7 and 12-15 under § 103(a) as being unpatentable over Bruck in view of Ohsaki, *et al.* However, since independent claim 2 is non-obvious under § 103 (as the Examiner has not made a *prima facie* case of obviousness), dependent claims 6-7 and 12-15 which depend from claim 2 also are non-obvious. *In re Fine, supra.*

Accordingly, for the above reasons, the rejection of claims 6-7 and 12-15 under § 103 as being unpatentable over Bruck in view of Arisaki, *et al.* should be withdrawn.

As discussed above with regard to the § 102 rejections, the structure and the arrangement of the elements of Applicants' claimed invention are significantly different from the cited references. None of the references remedies the deficiencies of the other cited references with respect to the claimed invention. Even when combined, the references do not yield Applicants' claimed invention.

One skilled in the art would not combine any of the references cited by the Examiner in support of the various § 103 rejections, because the combinations would not teach anything relevant to the field of the invention. Even when combined, the references are deficient since they do not disclose an apparatus for a hydrocarbon reforming process having all of the elements and limitations taught in Applicants' claimed invention.

Finally, as previously noted, the Examiner has not established a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. MPEP 2143.03, citing *In re*

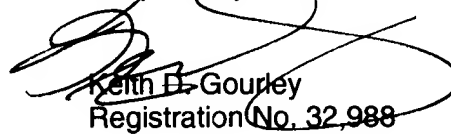
Royka, 490 F.2d 981, 180 USPQ 580 (C.C.P.A. 1974). Since there are features (previously discussed above) in the claims of Applicants' claimed invention that would not be obvious to one skilled in the art, the Examiner has not established a *prima facie* case of obviousness. None of the references (nor any combinations of the references) cited by the Examiner disclose those features.

For all of the foregoing reasons, withdrawal of all of the rejections under § 103 is requested.

Conclusion

For all of the foregoing reasons, Applicants submit that all of the pending claims are patentable over the art of record. Withdrawal of the rejections and objections are respectfully requested, and an early Notice of Allowance is earnestly solicited.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW THE CHANGES MADE

In The Title

The title has been amended as follows:

APPARATUS [AND METHOD] FOR HYDROCARBON REFORMING PROCESS

In The Claims

Claims 1, 2, 4, 5, 8, 11-13, 16, 18, 19, 22 and 23 have been amended as follows:

1. (Amended) An apparatus for a hydrocarbon reforming process, comprising:

at least one combustion chamber having a first end and a second end opposite said first end;

at least one convection chamber having a first end and a second end opposite said first end of said at least one convection chamber;

at least one burner disposed in said at least one combustion chamber, said burner adapted to combust a fuel, thereby generating a flue gas having sensible heat;

communication means between said at least one combustion chamber and said at least one convection chamber whereby at least a portion of said flue gas flows from said at least one combustion chamber to said at least one convection chamber at a first location adjacent said first end of said at least one convection chamber;

transfer means whereby at least a portion of said flue gas flows to a second location in said at least one convection chamber adjacent said second end of said at least one convection chamber;

a first reaction chamber adapted to receive a first portion of a mixed-feed,
a substantial portion of said first reaction chamber disposed in said at least one
combustion chamber; and

a second reaction chamber adapted to receive a second portion of said
mixed-feed or another mixed-feed, a substantial portion of said second reaction
chamber disposed in said at least one convection chamber.

2. (Amended) An apparatus for a hydrocarbon reforming process, comprising:

a vessel having at least one partition wall disposed in said vessel, said at
least one partition wall dividing said vessel into a plurality of chambers, including
at least one combustion chamber and at least one convection chamber, each of
said chambers having a first end and a second end opposite said first end;

at least one burner disposed in said at least one combustion chamber,
said burner adapted to combust a fuel, thereby generating a flue gas having
sensible heat;

communication means between said at least one combustion chamber
and said at least one convection chamber whereby at least a portion of said flue
gas flows from said at least one combustion chamber to said at least one
convection chamber at a first location adjacent said first end of said at least one
convection chamber;

transfer means whereby at least a portion of said flue gas flows to a
second location in said at least one convection chamber adjacent said second
end of said at least one convection chamber;

a first reaction chamber adapted to receive a first portion of a mixed-feed,
a substantial portion of said first reaction chamber disposed in said at least one
combustion chamber; and

a second reaction chamber adapted to receive a second portion of said
mixed-feed or another mixed-feed, a substantial portion of said second reaction
chamber disposed in said at least one convection chamber.

4. (Amended) An apparatus as in claim 2, wherein the substantial portion of said first
reaction chamber is substantially vertical within said at least one combustion chamber.

5. (Amended) An apparatus as in claim 2, wherein the substantial portion of said second
reaction chamber is substantially vertical within said at least one convection chamber.

8. (Amended) An assembly of multiple units for [a] the hydrocarbon reforming process,
each unit comprising [an] the apparatus as in claim 2.

11. (Twice Amended) An apparatus as in claim 2, further comprising [a] at least one flow
of [a] at least one of said mixed-feed and said another mixed-feed, wherein [a] said first portion
of said mixed-feed flows through said first reaction chamber co-currently with a flow of said at
least one flue gas in said combustion chamber, and [a] said second portion of said mixed-feed
or said another mixed-feed flows through said second reaction chamber counter-currently with
said flow of said flue gas in said at least one convection chamber.

12. (Twice Amended) An apparatus as in claim 6, further comprising [a] at least one flow of [a] at least one of said mixed-feed and said another mixed-feed, wherein [a] said first portion of said mixed-feed flows through said first reaction chamber co-currently with a flow of said flue gas in said at least one combustion chamber, and [a] said second portion of said mixed-feed or said another mixed-feed flows through said second reaction chamber counter-currently with said flow of said flue gas in said at least one convection chamber.

13. (Twice Amended) An apparatus as in claim 7, further comprising [a] at least one flow of [a] at least one of said mixed-feed and said another mixed-feed, wherein [a] said first portion of said mixed-feed flows through said first reaction chamber co-currently with a flow of said flue gas in said at least one combustion chamber, and [a] said second portion of said mixed-feed or said another mixed-feed flows through said second reaction chamber counter-currently with said flow of said flue gas in said at least one convection chamber.

16. (Amended) An apparatus for a hydrocarbon reforming process, comprising:

a vessel having at least one partition wall disposed in said vessel, said at least one partition wall dividing said vessel into a plurality of chambers, including at least one combustion chamber and at least one convection chamber, each of said chambers having a first end and a second end opposite said first end;

at least one burner disposed in said at least one combustion chamber, said burner adapted to combust a fuel, thereby generating a flue gas having sensible heat;

communication means between said at least one combustion chamber and said at least one convection chamber whereby at least a portion of said flue gas flows from said at least one combustion chamber to said at least one convection chamber at a first location adjacent said first end of said at least one convection chamber;

transfer means whereby at least a portion of said flue gas flows to a second location in said at least one convection chamber adjacent said second end of said at least one convection chamber;

a first reformer tube adapted to receive a first portion of a mixed-feed, a substantial portion of said first reformer tube disposed in said at least one combustion chamber; and

a second reformer tube adapted to receive a second portion of said mixed-feed or another mixed-feed, a substantial portion of said second reformer tube disposed in said at least one convection chamber.

18. (Amended) An assembly of multiple units for [a] the hydrocarbon reforming process, each unit comprising [an] the apparatus as in claim 16.

19. (Amended) An assembly as in claim 18 further comprising at least one duct, wherein the at least one convection chamber comprises [connecting] a first convection chamber and a second convection chamber [of said at least one convection chamber] in at least one unit of said assembly of multiple units, and the at least one duct connects the first convection chamber with the second convection chamber.

22. (Amended) An assembly of multiple units for [a] the hydrocarbon reforming process, each unit comprising [an] the apparatus as in claim 1.

23. (Amended) An assembly as in claim 22 further comprising at least one duct, wherein the at least one convection chamber comprises [connecting] a first convection chamber and a second convection chamber [of said at least one convection chamber] in at least one unit of said assembly of multiple units, and the at least one duct connects the first convection chamber with the second convection chamber.

FIG. 18

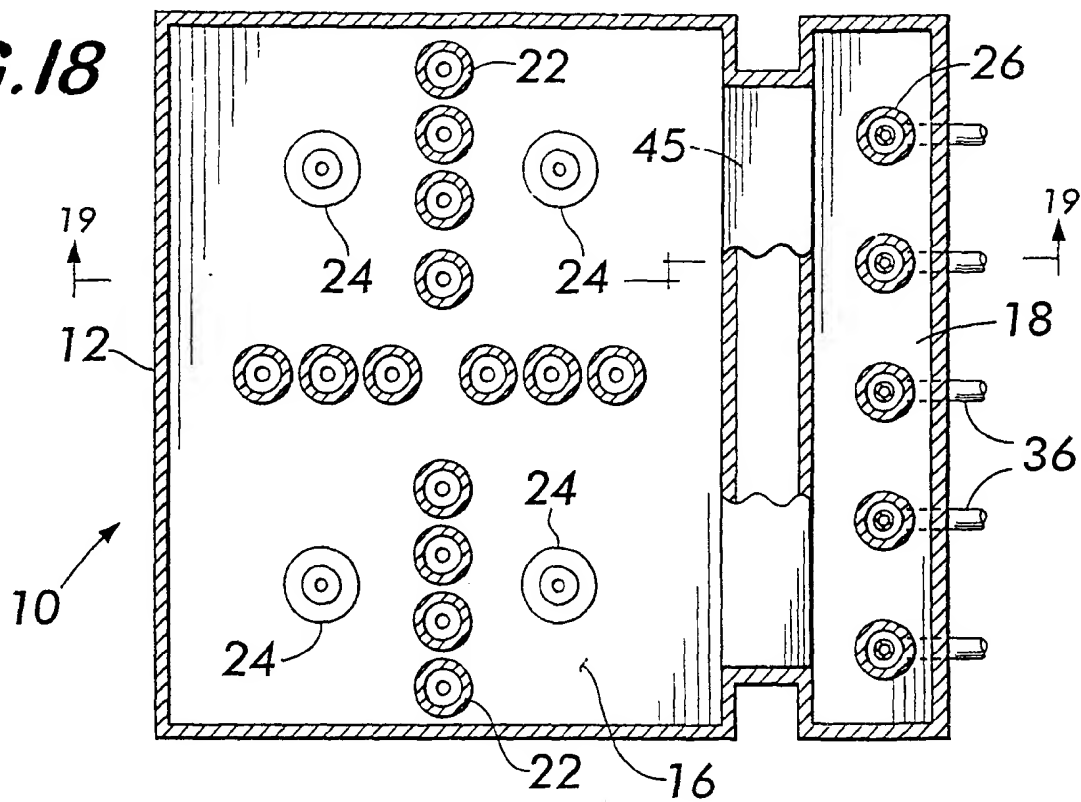
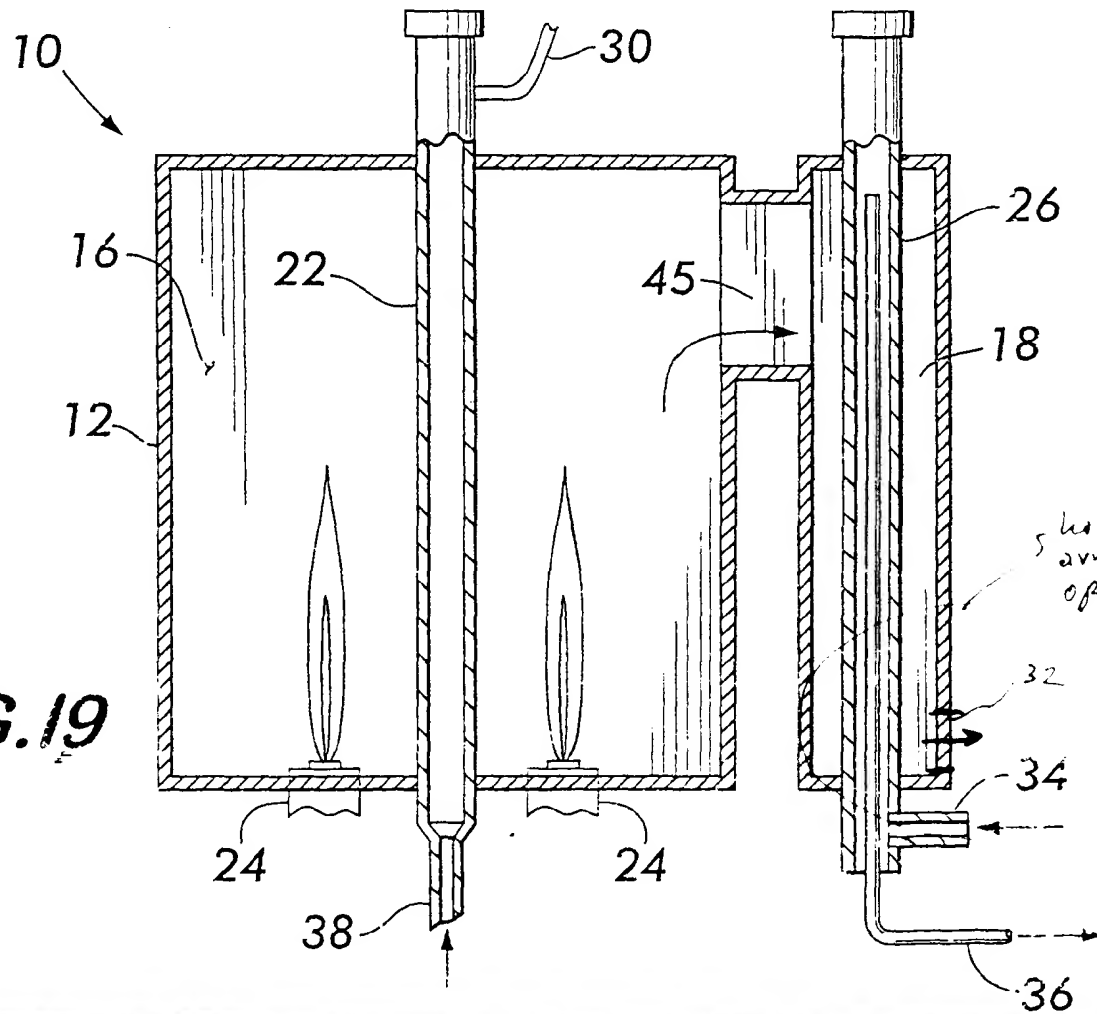


FIG. 19



approved
 by examiner
 6/26/03